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GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
200 FAIR OAKS LANE
FRANKFORT, KENTUCKY 40601
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LEONARD K. PETERS
SECRETARY

FACT SHEET

**KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT TO DISCHARGE TREATED WASTEWATER
INTO WATERS OF THE COMMONWEALTH**

PERMIT No.: KY0095192 Permit Writer: Sara J. Beard Date: July 20, 2009
AI No.: 3148

1. **SYNOPSIS OF APPLICATION**

a. Name and Address of Applicant

Kimberly-Clark Corporation
351 Phelps Drive
Irving, Texas 75038

b. Facility Location

Kimberly-Clark Corporation
601 Innovative Way
Owensboro, Daviess County, Kentucky

c. Description of Applicant's Operation

This facility is an integrated recycled fiber deinking and paper mill with associated converting operations that manufacture bathroom tissues and towels (SIC Codes 2621 and 2611).

d. Production Capacity of Facility

Nonintegrated Tissue Production - 163 tons/day (326,000 lbs)
Deinked Tissue Production - 280 tons/day (560,000 lbs)

e. Description of Existing Pollution Abatement Facilities

Outfall 001 - The combined deinking process waters, paper machine waters, cooling tower blowdown, boiler blowdown, and sludge dewatering are treated by screw press, screening, primary clarification, aeration, secondary clarification, final clarification, and UV disinfection.

1. **SYNOPSIS OF APPLICATION - continued**

e. Description of Existing Pollution Abatement Facilities - continued

Outfall 002 - Pre-aeration, neutralization, activated sludge, settling, disinfection of sanitary wastewater.

Outfall 003 - Sedimentation and neutralization of stormwater runoff, HVAC condensate, and cooling tower blowdown.

f. Permitting Action

Reissuance of a major KPDES permit for a new source to a manufacturer of sanitary paper products.

2. **RECEIVING WATERS**

a. Receiving Water Name

Outfall 001 discharges to the Ohio River at N 37°52'00", W 87°16'10" (mile point 765).

Outfalls 002 and 003 discharge to the Green River at N 37°49'01", W 87°18'14" and N 37°52'05", W 87°18'00", respectively.

b. Stream Segment Use Classifications

The Ohio River and Green River are classified as Warm Water Aquatic Habitat, Primary Contact Recreation, Secondary Contact Recreation, and Domestic Water Supply.

c. Stream Segment Antidegradation Categorization

This segment of the Ohio River is listed as Impaired on the 2008 303(d) List of Waters For Kentucky. Impairments include nonsupport of primary contact recreation and partial support of fish consumption. The pollutants of concern are Dioxin (including 2,3,7,8-TCDD), Polychlorinated Biphenyls, and Fecal Coliform. Suspected sources are Unspecified Urban Stormwater, Agriculture, Combined Sewer Overflows, and unknown sources.

This segment of the Green River is a High Quality Water.

d. Stream Low Flow Condition

At the point of discharge, the 7Q10 and the Harmonic Mean for the Ohio river 13,000 and 65,700 cfs, respectively. The 7Q10 and Harmonic Mean for the Green River at the point of discharge are 600 and 11,700 cfs, respectively.

3. REPORTED DISCHARGE AND PROPOSED LIMITS

Description of Discharge - Outfall 001 - The combined deinking process waters, paper machine waters, cooling tower blowdown, boiler blowdown, and sludge dewatering are treated by screw press, screening, primary clarification, aeration, secondary clarification, final clarification, and UV disinfection.

Effluent Characteristics	Reported Discharge		Proposed Limits		Applicable Water Quality Criteria and/or Effluent Guidelines
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	
Flow (MGD)	3.09	3.40	Report	Report	401 KAR 5:065, Section 2(8)
Total Suspended Solids (lbs/day)	306.7	1056.9	4656	9292	401 KAR 5:065, Sections 4 and 5
BOD ₅ (lbs/day)	121.2	256.1	4020	7658	401 KAR 5:065, Sections 4 and 5
Pentachlorophenol ¹ (lbs/day)	N/R	N/R	N/A	2.59	401 KAR 5:065, Sections 4 and 5
Trichlorophenol ¹ (lbs/day)	N/R	N/R	N/A	4.17	401 KAR 5:065, Sections 4 and 5
Acute Toxicity (TUa)	N/R	1.10	N/A	6.90	401 KAR 10:029, Section 5 401 KAR 10:031, Sections 1 and 4
pH (Standard Units)	7.0	8.0	6.0 min	9.0 max	401 KAR 10:031, Section 4

The data contained under the Reported Discharge columns are not from the renewal application, but rather from the analysis of the DMR data that has been reported during the term of the current permit.

The abbreviation BDL means Below Detection Limit.
 The abbreviation N/A means Not Applicable.
 The abbreviation N/R means Not Reported.
 The abbreviation BOD₅ means Biochemical Oxygen Demand (5-day).

¹ Kimberly-Clark Corporation has certified to the Division of Water that it does not use any chlorophenolic-containing biocides at the plant. Pursuant to 40 CFR Parts 430.95 and 430.125, the effluent limits for these compounds do not apply.

4. METHODOLOGY USED IN DETERMINING LIMITATIONS

a. Serial Number

Outfall 001 - The combined deinking process waters, paper machine waters, cooling tower blowdown, boiler blowdown, and sludge dewatering are treated by screw press, screening, primary clarification, aeration, secondary clarification, final clarification, and UV disinfection.

b. Effluent Characteristics

Flow	Total Suspended Solids	BOD ₅
Pentachlorophenol	Trichlorophenol	Acute Toxicity
pH		

c. Pertinent Factors

This facility is subject to the "New Source Performance Standards" (NSPS), 40 CFR Part 430 - Pulp, Paper, and Paperboard Point Source Category. More specifically, this facility is subject to the NSPS requirements for Facilities Where Tissue Paper is Produced in Subpart I - Secondary Fiber Deink Subcategory (40 CFR 430.95) and the NSPS requirements for Non-Integrated Mills Where Tissue Papers Are Produced From Purchased Pulp in Subpart L - Tissue, Filter, Non-Woven, and Paperboard From Purchased Pulp Subcategory (40 CFR 430.125).

Kimberly-Clark Corporation has certified to the Division of Water that it does not use any chlorophenolic-containing biocides at the plant. Pursuant to 40 CFR Parts 430.95 and 430.125, the effluent limits for Pentachlorophenol and Trichlorophenol do not apply.

A summarization of the effluent guidelines, water quality standards, assumptions, and calculations can be found in Fact Sheet Attachment A - Regulatory Requirements.

A mixing zone has been assigned to this outfall for Acute Toxicity. A summarization of the assumptions and calculations associated with the multiport diffuser can be found in Fact Sheet Attachment B - CORMIX Diffuser Modeling.

d. Monitoring Requirements

The flow shall be monitored continuously by recorder.

BOD₅ and Total Suspended Solids shall be monitored twice per week by 24-hour composite sample.

pH shall be monitored once per day by grab sample.

Acute Toxicity shall be monitored once per quarter by two (2) grab samples.

4. METHODOLOGY USED IN DETERMINING LIMITATIONS - continued

e. Justification of Limits

The Kentucky Administrative Regulations (KARs) cited below have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes (KRSs).

Flow

The monitoring requirements for this parameter are consistent with the requirements of 401 KAR 5:065, Section 2(8).

BOD₅, Total Suspended Solids, Pentachlorophenol, and Trichlorophenol

The limits for these parameters are consistent with the requirements of 401 KAR 5:065, Sections 4 and 5. These limits are representative of the "New Source Performance Standards" (NSPS), 40 CFR Part 430 - Pulp, Paper, and Paperboard Point Source Category (40 CFR 430.95 and 40 CFR 430.125).

pH

The limits for this parameter are consistent with the requirements of 401 KAR 10:031, Section 4.

Acute Toxicity

The limit for this parameter is consistent with the requirements of 401 KAR 10:029, Section 5 and 401 KAR 10:031, Sections 1 and 4.

5. REPORTED DISCHARGE AND PROPOSED LIMITS

Description of Discharge - Outfall 002 - Pre-aeration, neutralization, activated sludge, settling, disinfection of sanitary wastewater.

Effluent Characteristics	Reported Discharge		Proposed Limits		Applicable Water Quality Criteria and/or Effluent Guidelines
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	
Flow (MGD)	0.003	0.006	Report	Report	401 KAR 5:065, Section 2(8)
BOD ₅ (mg/l)	3.25	3.26	30	45	401 KAR 10:031, Section 4 401 KAR 5:045, Sections 3 and 5
TSS (mg/l)	5.76	5.77	30	45	401 KAR 10:031, Section 4 401 KAR 5:045, Sections 2 and 3
Fecal Coliform (N/100 ml)	13.3	21.5	Removing from permit		401 KAR 5:080, Section 1(2)(c)2
<i>Escherichia Coli</i> (N/100 ml)	N/R	N/R	130	240	401 KAR 10:031, Section 7 401 KAR 5:045, Section 4 401 KAR 5:080, Section 1(2)(c)2
Ammonia Nitrogen (as mg/l N)	0.68	0.68	20	30	401 KAR 10:031, Section 4 401 KAR 5:045, Sections 3 and 5
Dissolved Oxygen (mg/l) (minimum)	2.44 min	N/R	Not less than 2.0		401 KAR 10:031, Section 4 401 KAR 5:045, Sections 3 and 5
pH (standard units)	6.3	7.9	6.0 (min)	9.0 (max)	401 KAR 10:031, Section 4 401 KAR 5:045, Section 4

The data contained under the reported discharge columns is not from the renewal application, but rather from the analysis of the DMR data that has been reported during the term of the previous permit.

The abbreviation BOD₅ means Biochemical Oxygen Demand (5-day).

The abbreviation TSS means Total Suspended Solids.

The abbreviation N/R means not reported on the Discharge Monitoring Report (DMR).

The effluent limitations for BOD₅ and TSS are Monthly (30 day) and Weekly (7 day) Averages.

The effluent limitations for *Escherichia Coli* are thirty (30) day and seven (7) day Geometric Means.

6. METHODOLOGY USED IN DETERMINING LIMITATIONS

a. Serial Number

Outfall 002 - Pre-aeration, neutralization, activated sludge, settling, disinfection of sanitary wastewater.

b. Effluent Characteristics

Flow	BOD ₅	Total Suspended Solids
Fecal Coliform Bacteria	<i>Escherichia Coli</i>	Ammonia Nitrogen
Dissolved Oxygen	pH	

c. Pertinent Factors

On September 8, 2004 Kentucky's revised water quality standards, 401 KAR 10:031 became effective.

d. Monitoring Requirements

Flow shall be monitored instantaneously once per month.

BOD₅, Total Suspended Solids, and Ammonia Nitrogen shall be monitored once per month by 24 hour composite sampling.

Escherichia Coli, pH, and Dissolved Oxygen shall be monitored once per month by grab sample.

e. Justification of Conditions

The Kentucky regulations cited below have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes.

Escherichia Coli and Fecal Coliform Bacteria

The limits for *Escherichia Coli* are consistent with the requirements of 401 KAR 10:031, Section 7, 401 KAR 5:045 Section 4 and 401 KAR 5:080, Section 1(2)(c) 2. The removal of Fecal Coliform Bacteria is consistent with the requirements of 401 KAR 5:080 Section 1 (2) (c)2. Although Fecal Coliform Bacteria has been used as an indicator of fecal contamination, it does contain other species that are not necessarily fecal in origin. EPA recommends *Escherichia Coli*, which is specific to fecal material from warm-blooded animals, as the best indicator of health risk from contact with recreational waters. Therefore, it is the "Best Professional Judgment "BPJ" of the Division of Water that *Escherichia Coli* replace Fecal Coliform Bacteria on this permit.

Flow

The monitoring requirements for this parameter are consistent with the requirements of 401 KAR 5:065, Section 2(8).

6. METHODOLOGY USED IN DETERMINING LIMITATIONS - continued

e. Justification of Limits

The Kentucky Administrative Regulations (KARs) cited below have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes (KRSs).

BOD₅ and Total Suspended Solids

The limits for these parameters are consistent with the requirements of 401 KAR 10:031, Section 4 and 5:045, Sections 2 and 3. Section 4 of 10:031 establishes water quality criteria for the protection of Kentucky's waters. Sections 2 and 3 of 5:045 require biochemically degradable wastewaters to receive secondary treatment.

pH

The limits for these parameters are consistent with the requirements of 401 KAR 10:031, Section 4 and 5:045, Section 4. Section 4 of 10:031 establishes water quality criteria for the protection of Kentucky's waters. Section 4 of 5:045 establishes the acceptable levels of these parameters for biochemically degradable wastewaters.

7. REPORTED DISCHARGE AND PROPOSED LIMITS

Description of Discharge - Outfall 003 - Sedimentation and neutralization of stormwater runoff, HVAC condensate, and cooling tower blowdown.

Effluent Characteristics	Reported Discharge		Proposed Limits		Applicable Water Quality Criteria and/or Effluent Guidelines
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	
Flow (MGD)	0.17	3.00	Report	Report	401 KAR 5:065, Section 2(8)
Settleable Solids (ml/l)	0.79	0.79	Report	Report	401 KAR 5:065, Section 2(8)
Hardness (as mg/l CaCO ₃)	78.2	78.6	Report	Report	401 KAR 5:065, Section 2(8)
Specific Conductance	192	193	Report	Report	401 KAR 5:065, Section 2(8)
pH (Standard Units)	6.4	9.8	6.0 min	9.0 max	401 KAR 10:031, Section 4

The data contained under the Reported Discharge columns are not from the renewal application, but rather from the analysis of the DMR data that has been reported during the term of the current permit.

8. METHODOLOGY USED IN DETERMINING LIMITATIONS

a. Serial Number

Outfall 003 - Sedimentation and neutralization of stormwater runoff, HVAC condensate, and cooling tower blowdown.

b. Effluent Characteristics

Flow	Settleable Solids	Hardness
Specific Conductance	pH	

c. Pertinent Factors

On September 8, 2004 Kentucky's revised water quality standards, 401 KAR 10:031 became effective.

d. Monitoring Requirements

Flow shall be monitored instantaneously once per month.

Settleable Solids, Hardness, Specific Conductance, and pH shall be monitored once per month by grab sample.

e. Justification of Limits

The Kentucky Administrative Regulations (KARs) cited below have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes (KRSs).

Flow, Settleable Solids, Hardness, and Specific Conductance

The monitoring requirements for these parameters are consistent with the requirements of 401 KAR 5:065, Section 2(8).

pH

The limits for this parameter are consistent with the requirements of 401 KAR 10:031, Section 4.

9. ANTIDegradation

The conditions of 401 KAR 10:029, Section 1 have been satisfied by this permit action. Since this permit action involves reissuance of an existing permit, and does not propose an expanded discharge, a review under 401 KAR 10:030 Section 1 is not applicable.

10. PROPOSED COMPLIANCE SCHEDULE FOR ATTAINING EFFLUENT LIMITATIONS

The permittee shall comply with the effluent limitations and permit conditions by the effective date of the permit.

11. PROPOSED SPECIAL CONDITIONS WHICH WILL HAVE A SIGNIFICANT IMPACT ON THE DISCHARGEBest Management Practices (BMP) Plan

Pursuant to 401 KAR 5:065, Section 2(10), a BMP requirement shall be included: to control or abate the discharge of pollutants from ancillary areas containing toxic or hazardous substances or those substances which could result in an environmental emergency; where numeric effluent limitations are infeasible; or to carry out the purposes and intent of KRS 224. The facility has several areas where support activities occur which have a potential of the discharge of such substances through storm water runoff or spillage. Some of these areas will drain to present wastewater treatment plants, others will not.

Cooling Water Additives, FIFRA, and Mollusk Control

The discharge of any product registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) in cooling water which has the potential to ultimately be released to the waters of the Commonwealth is prohibited, except Herbicides, unless specifically identified and authorized by the KPDES permit.

In the event the permittee desires to use any biocide or chemical not previously reported for mollusk control or other purpose, the permittee shall submit sufficient information to the Division of Water for review and establishment of appropriate control parameters. The required information shall be submitted a minimum of thirty (30) days prior to the commencement of use of said biocide or chemical and shall include:

1. Name and general composition of biocide or chemical,
2. Any and all aquatic organism toxicity data,
3. Quantities to be used,
4. Frequencies of use,
5. Proposed discharge concentrations, and
6. EPA registration number, if applicable.

Outfall Signage

As a member of ORSANCO (Ohio River Valley Sanitation Commission) the Commonwealth of Kentucky through the Division of Water implements a requirement that the permittee post a permanent marker at each discharge point to the Ohio River. It is the Best Professional Judgment of the Division of Water, 401 KAR 5:080, Section 1(2)(c)2, that all permittees post a marker at all discharge locations and/or monitoring points. The ORSANCO requirements for the marker specify it to be at least 2 feet by 2 feet in size and a minimum of 3 feet above ground level with the Permittee Name and KPDES permit and outfall numbers in 2 inch letters. For internal monitoring points the marker shall be of sufficient size to include the outfall number in 2 inch letters and is to be posted as near as possible to the actual sampling location. The permittee shall comply with these requirements within sixty (60) days of the effective date of this permit.

12. PERMIT DURATION

Five (5) years. This facility is in the Trade/Green Basin Management Unit as per the Kentucky Watershed Management Framework.

13. PERMIT INFORMATION

The application, draft permit fact sheet, public notice, comments received, and additional information is available by writing the Division of Water at 200 Fair Oaks Lane, Frankfort, Kentucky 40601.

14. **REFERENCES AND CITED DOCUMENTS**

All material and documents referenced or cited in this fact sheet are a part of the permit information as described above and are readily available at the Division of Water Central Office. Information regarding these materials may be obtained from the person listed below.

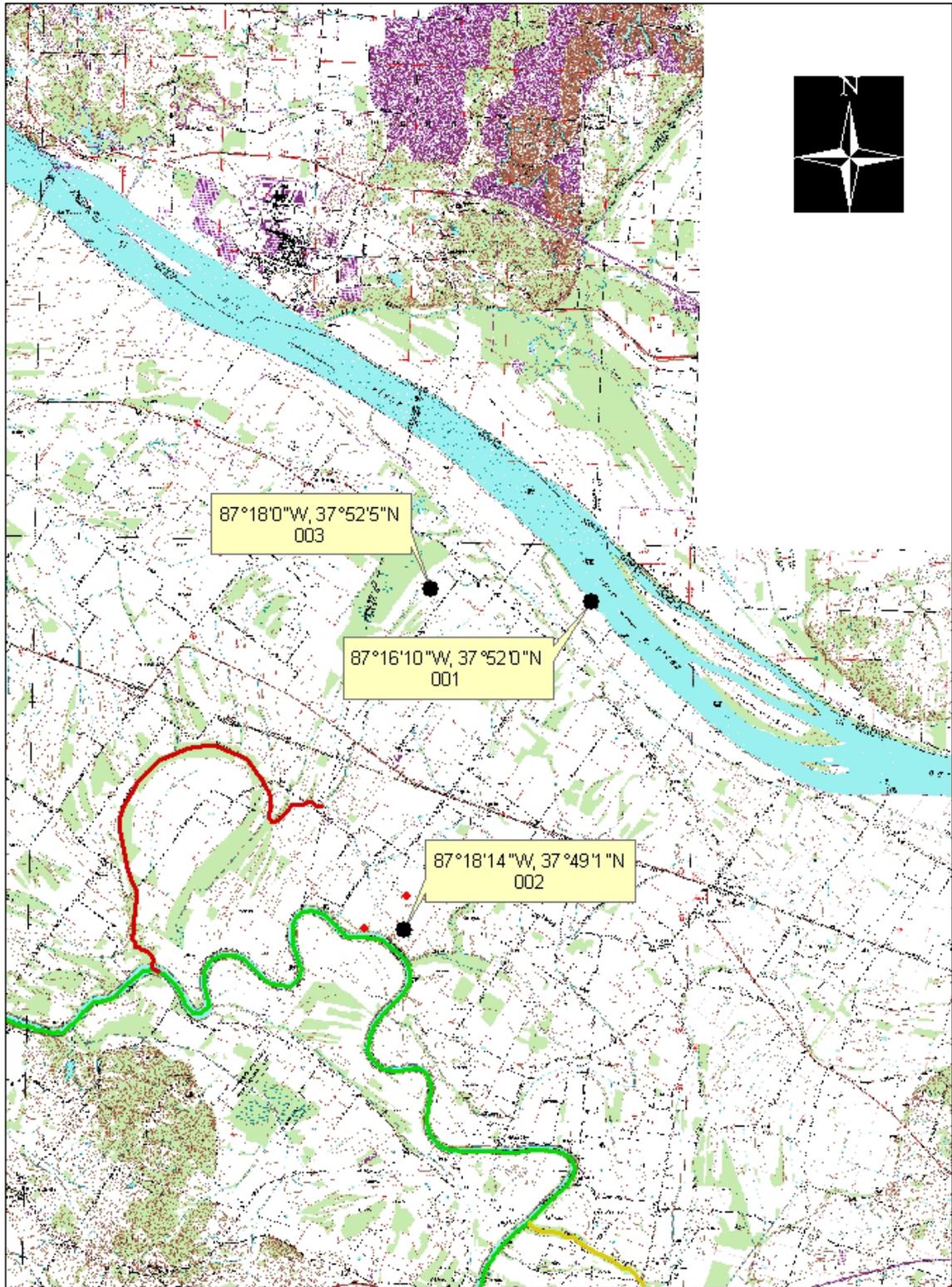
15. **CONTACT**

For further information contact the individual identified on the Public Notice or the Permit Writer - Sara Beard at (502) 564-3410, extension 4925 or e-mail Sara.Beard@ky.gov.

16. **PUBLIC NOTICE INFORMATION**

Please refer to the attached Public Notice for details regarding the procedures for a final permit decision, deadline for comments and other information required by 401 KAR 5:075, Section 4(2)(e).

Site Map



0 4,750 9,500 19,000 Feet

KPDES



KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT

PERMIT NO.: KY0095192

AI No.: 3148

AUTHORIZATION TO DISCHARGE UNDER THE KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

Pursuant to Authority in KRS 224,

Kimberly-Clark Corporation
351 Phelps Drive
Irving, Texas 75038

is authorized to discharge from a facility located at

Kimberly-Clark Corporation
601 Innovative Way
Owensboro, Daviess County, Kentucky

to receiving waters named

Outfall 001 discharges to the Ohio River at N 37°52'00", W 87°16'10" (mile point 765).

Outfalls 002 and 003 discharge to the Green River at N 37°49'01", W 87°18'14 and N 37°52'05", W 87°18'00, respectively.

in accordance with effluent limitations, monitoring requirements and other conditions set forth in PARTS I, II, III, IV, and V hereof. The permit consists of this cover sheet, and PART I 4 pages, PART II 1 page, PART III 1 page, PART IV 3 pages, PART V 3 pages.

This permit shall become effective on

This permit and the authorization to discharge shall expire at midnight,

Date Signed

Sandra L. Gruzesky, Director
Division of Water

A1. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from Outfall serial number: 001 - The combined deinking process waters, paper machine waters, cooling tower blowdown, boiler blowdown, and sludge dewatering are treated by screw press, screening, primary clarification, aeration, secondary clarification, final clarification, and UV disinfection.

Such discharges shall be limited and monitored by the permittee as specified below:

<u>EFFLUENT CHARACTERISTICS</u>	<u>DISCHARGE LIMITATIONS</u>		<u>MONITORING REQUIREMENTS</u>	
	<u>Monthly</u> <u>Avg.</u>	<u>Daily</u> <u>Max.</u>	<u>Measurement</u> <u>Frequency</u>	<u>Sample</u> <u>Type</u>
Flow (MGD)	Report	Report	Continuous	Recorder
Total Suspended Solids (lbs/day)	4656	9292	2/Week	24-Hr. Composite
BOD ₅ (lbs/day)	4020	7658	2/Week	24-Hr. Composite
Pentachlorophenol ¹ (lbs/day)	N/A	2.59	2/Week	Grab
Trichlorophenol ¹ (lbs/day)	N/A	4.17	2/Week	Grab
Acute Toxicity (TUa)	N/A	6.90	1/Quarter	2 Grabs

The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units, and shall be monitored 1/Day by Grab sample.

There shall be no discharge of floating solids or visible foam or sheen in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: nearest accessible point prior to discharge to or mixing with the receiving waters or wastestreams from other outfalls.

The abbreviation N/A means Not Applicable.

The abbreviation BOD₅ means Biochemical Oxygen Demand (5-day).

¹ Kimberly-Clark Corporation has certified to the Division of Water that it does not use any chlorophenolic-containing biocides at the plant. Pursuant to 40 CFR Parts 430.95 and 430.125, the effluent limits for these compounds do not apply.

A2. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from Outfall serial numbers: 002 - Pre-aeration, neutralization, activated sludge, settling, disinfection of sanitary wastewater.

Such discharges shall be limited and monitored by the permittee as specified below:

<u>EFFLUENT CHARACTERISTICS</u>	<u>DISCHARGE LIMITATIONS</u>		<u>MONITORING REQUIREMENTS</u>	
	Monthly <u>Avg.</u>	Daily <u>Max.</u>	Measurement <u>Frequency</u>	Sample <u>Type</u>
Flow (MGD)	Report	Report	1/Month	Instantaneous
BOD ₅ (mg/l)	30	45	1/Month	24-Hr. Composite
TSS (mg/l)	30	45	1/Month	24-Hr. Composite
Ammonia Nitrogen (as mg/l N)	20	30	1/Month	24-Hr. Composite
Fecal Coliform (N/100 ml)	Removing from Permit			
<i>Escherichia Coli</i> (N/100 ml)	130	240	1/Month	Grab
Dissolved Oxygen (mg/l)	2.0(min)	N/A	1/Month	Grab

The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/Month by Grab sample.

There shall be no discharge of floating solids or visible foam or sheen in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: nearest accessible point after final treatment, but prior to actual discharge to or mixing with the receiving waters or wastestreams from other outfalls.

The abbreviation N/A means Not Applicable.

The abbreviation BOD₅ means Biochemical Oxygen Demand (5-day).

The abbreviation TSS means Total Suspended Solids.

The effluent limitations for BOD₅ and TSS are Monthly (30 day) and Weekly (7 day) Averages.

The effluent limitations for *Escherichia Coli* are thirty (30) day and seven (7) day Geometric Means.

A3. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from Outfall serial number: 003 - Sedimentation and neutralization of stormwater runoff, HVAC condensate, and cooling tower blowdown.

Such discharges shall be limited and monitored by the permittee as specified below:

<u>EFFLUENT CHARACTERISTICS</u>	<u>DISCHARGE LIMITATIONS</u>		<u>MONITORING REQUIREMENTS</u>	
	Monthly <u>Avg.</u>	Daily <u>Max.</u>	Measurement <u>Frequency</u>	Sample <u>Type</u>
Flow (MGD)	Report	Report	1/Month	Instantaneous
Settleable Solids (ml/l)	Report	Report	1/Month	Grab
Hardness (mg/l as CaCO ₃)	Report	Report	1/Month	Grab
Specific Conductance	Report	Report	1/Month	Grab

The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/Month by Grab sample.

There shall be no discharge of floating solids or visible foam or sheen in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: nearest accessible point after final treatment, but prior to actual discharge to or mixing with the receiving waters or wastestreams from other outfalls.

B. Schedule of Compliance

The permittee shall comply with the effluent limitations and permit conditions by the effective of the permit.

C. Cooling Water Additives, FIFRA, and Mollusk Control

The discharge of any product registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) in cooling water which has the potential to ultimately be released to the waters of the Commonwealth is prohibited, except Herbicides, unless specifically identified and authorized by the KPDES permit.

In the event the permittee desires to use any biocide or chemical not previously reported for mollusk control or other purpose, the permittee shall submit sufficient information to the Division of Water for review and establishment of appropriate control parameters. The required information shall be submitted a minimum of thirty (30) days prior to the commencement of use of said biocide or chemical and shall include:

1. Name and general composition of biocide or chemical,
2. Any and all aquatic organism toxicity data,
3. Quantities to be used,
4. Frequencies of use,
5. Proposed discharge concentrations, and
6. EPA registration number, if applicable.

PART II - STANDARD CONDITIONS FOR KPDES PERMIT

This permit has been issued under the provisions of KRS Chapter 224 and regulations promulgated pursuant thereto. Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits or licenses required by this Cabinet and other state, federal, and local agencies.

It is the responsibility of the permittee to demonstrate compliance with permit parameter limitations by utilization of sufficiently sensitive analytical methods.

The permittee is also advised that all KPDES permit conditions in KPDES Regulation 401 KAR 5:065, Section 1 will apply to all discharges authorized by this permit.

PART III - OTHER REQUIREMENTS

A. Reporting of Monitoring Results

Monitoring results obtained during each monitoring period must be reported on a preprinted Discharge Monitoring Report (DMR) Form that will be mailed to you. The completed DMR for each monitoring period must be sent to the Division of Water at the address listed below (with a copy to the appropriate Regional Office) postmarked no later than the 28th day of the month following the monitoring period for which monitoring results were obtained.

Division of Water
Madisonville Regional Office
625 Hospital Drive
Madisonville, Kentucky 42431
ATTN: Supervisor

Energy & Environment Cabinet
Dept. for Environmental Protection
Division of Water/Surface Water Permits Branch
200 Fair Oaks Lane
Frankfort, Kentucky 40601

B. Reopener Clause

This permit shall be modified, or alternatively revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under 401 KAR 5:050 through 5:085, if the effluent standard or limitation so issued or approved:

1. Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
2. Controls any pollutant not limited in the permit.

The permit as modified or reissued under this paragraph shall also contain any other requirements of KRS Chapter 224 when applicable.

C. Outfall Signage

The permittee shall post a permanent marker at all discharge locations and/or monitoring points. The marker shall be at least 2 feet by 2 feet in size and a minimum of 3 feet above ground level with the Permittee Name and KPDES permit and outfall numbers in 2 inch letters. For internal monitoring points the marker shall be of sufficient size to include the outfall number in 2 inch letters and shall be posted as near as possible to the actual sampling location. The permittee shall comply with these requirements within sixty (60) days of the effective date of this permit.

PART IV - BEST MANAGEMENT PRACTICES

SECTION A. GENERAL CONDITIONS

1. Applicability

These conditions apply to all permittees who use, manufacture, store, handle or discharge any pollutant listed as toxic under Section 307(a)(1) of the Clean Water Act, oil, as defined in Section 311(a)(1) of the Act, and any pollutant listed as hazardous under Section 311 of the Act and who have ancillary manufacturing operations which could result in (1) the release of a hazardous substance, pollutant, or contaminant in a reportable quantity, or (2) an environmental emergency, as defined in KRS 224.01-400, as amended, or any regulation promulgated pursuant thereto (hereinafter, the "BMP pollutants"). These operations include material storage areas; plant site runoff; in-plant transfer, process and material handling areas; loading and unloading operations, and sludge and waste disposal areas.

2. BMP Plan

The permittee shall develop and implement a Best Management Practices (BMP) plan consistent with 401 KAR 5:065, Section 2(10) pursuant to KRS 224.70-110, which prevents, or minimizes the potential for, the release of "BMP pollutants" from ancillary activities through plant site runoff; spillage or leaks, sludge or waste disposal; or drainage from raw material storage. A Best Management Practices (BMP) plan will be prepared by the permittee unless the permittee can demonstrate through the submission of a BMP outline that the elements and intent of the BMP have been fulfilled through the use of existing plans such as the Spill Prevention Control and Countermeasure (SPCC) plans, contingency plans, and other applicable documents.

3. Implementation

The plan shall be modified to implement the requirements of Section B - Specific Conditions as soon as possible but not later than one (1) year from the effective date of the permit.

4. General Requirements

The BMP plan shall:

- a. Be documented in narrative form, and shall include any necessary plot plans, drawings or maps.
- b. Establish specific objectives for the control of toxic and hazardous pollutants.
 - (1) Each facility component or system shall be examined for its potential for causing a release of "BMP pollutants" due to equipment failure, improper operation, natural phenomena such as rain or snowfall, etc.
 - (2) Where experience indicates a reasonable potential for equipment failure (e.g., a tank overflow or leakage), natural condition (e.g., precipitation), or other circumstances which could result in a release of "BMP pollutants", the plan should include a prediction of the direction, rate of flow and total quantity of the pollutants which could be released from the facility as result of each condition or circumstance.

- c. Establish specific best management practices to meet the objectives identified under Paragraph b of this section, addressing each component or system capable of causing a release of "BMP pollutants."
- d. Include any special conditions established in part B of this section.
- e. Be reviewed by plant engineering staff and the plant manager.

5. Specific Requirements

The plan shall be consistent with the general guidance contained in the publication entitled "NPDES Best Management Practices Guidance Document" and shall include the following baseline BMP's as a minimum.

- a. BMP Committee
- b. Reporting of BMP Incidents
- c. Risk Identification and Assessment
- d. Employee Training
- e. Inspections and Records
- f. Preventive Maintenance
- g. Good Housekeeping
- h. Materials Compatibility
- i. Security
- j. Materials Inventory

6. SPCC Plans

The BMP plan may reflect requirements for Spill Prevention Control and Countermeasure (SPCC) plans under Section 311 of the Act and 40 CFR Part 151, and may incorporate any part of such plans into the BMP plan by reference.

7. Hazardous Waste Management

The permittee shall assure the proper management of solids and hazardous waste in accordance with the regulations promulgated under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1978 (RCRA) (40 U.S.C. 6901 et seq.) Management practices required under RCRA regulations shall be referenced in the BMP plan.

8. Documentation

The permittee shall maintain a description of the BMP plan at the facility and shall make the plan available to the Director within one (1) year after the effective date of the permit. Copies of the BMP plan shall be sent to:

Division of Water
Madisonville Regional Office
625 Hospital Drive
Madisonville, Kentucky 42431
ATTN: Supervisor

Energy & Environment Cabinet
Dept. for Environmental Protection
Division of Water/Surface Water Permits Branch
200 Fair Oaks Lane
Frankfort, Kentucky 40601

9. BMP Plan Modification

The permittee shall amend the BMP plan whenever there is a change in the facility or change in the operation of the facility which materially increases the potential for the ancillary activities to result in the release of "BMP pollutants."

10. Modification for Ineffectiveness

If the BMP plan proves to be ineffective in achieving the general objective of preventing the release of "BMP pollutants" then the specific objectives and requirements under Paragraphs b and c of Section 4, the permit and/or the BMP plan shall be subject to modification to incorporate revised BMP requirements. If at any time following the issuance of this permit, the BMP plan is found to be inadequate pursuant to a state or federal site inspection or plan review, the plan shall be modified to incorporate such changes necessary to resolve the concerns.

SECTION B. SPECIFIC CONDITIONS

1. Periodically Discharged Wastewaters Not Specifically Covered By Effluent Guidelines

Kimberly-Clark Corporation shall include in this BMP Plan procedures and controls necessary for the handling of periodically discharged wastewaters such as intake screen backwash, meter calibration, fire protection, hydrostatic testing water, water associated with demolition projects, etc.

PART V - BIOMONITORING - ACUTE CONCERNS

In accordance with PART I of this permit, the permittee shall initiate, within 30 days of the effective date of this permit, or continue the series of tests described below to evaluate wastewater toxicity of the discharge from Outfall 001.

TEST REQUIREMENTS

The permittee shall perform a 48-hour static non-renewal toxicity test with water flea (Ceriodaphnia dubia) and a 48-hour static non-renewal toxicity test with fathead minnow (Pimephales promelas). Tests shall be conducted on each of two grab samples taken over a 24-hour period approximately 12 hours apart (e.g. discrete sample #1 taken at 9:00 a.m., sample #2 taken at 9:00 p.m.). In addition to use of a control, effluent concentrations for the tests must include the permitted limit, (i.e., 14.5% effluent) and at least four additional effluent concentrations. For a permit limit of 100% effluent, test concentrations shall be 20%, 40%, 60%, 80% and 100%. If the permit limit is less than 100% effluent and greater than or equal to 75% effluent, the test concentrations shall include the permitted limit, two concentrations below the limit that are based on a 0.5 dilution factor, and two concentrations above the limit (to include 100% and mid-point between the permit limit and 100%). If the permit limit is less than 75% effluent, test concentrations shall include the permit limit concentration, two concentrations below the limit based on a 0.5 dilution factor, and two concentrations above the limit based on a 0.5 dilution factor if possible, otherwise to include 100% and mid-point between the permit limit and 100%. Selection of different effluent concentrations must be approved by the Division prior to testing. Testing of the effluent shall be initiated within 36 hours of each sample collection. Controls shall be conducted concurrently with effluent testing using synthetic water. The analysis will be deemed reasonable and good only if control survival is 90% or greater in test organisms held in synthetic water. Any test that does not meet the control acceptability criteria shall be repeated as soon as practicable within the monitoring period (i.e. monthly or quarterly). Noncompliance with the toxicity limit will be demonstrated if the LC₅₀ is less than 14.2% effluent.

Tests shall be conducted on both species at the frequency specified in PART I of this permit.

If after at least six consecutive toxicity tests it can be determined that Ceriodaphnia dubia or the fathead minnow is more sensitive and all tests have passed, a request for testing with only the most sensitive species can be submitted to the Division. Upon approval, that most sensitive species may be considered as representative and all subsequent compliance tests can be conducted using only that species unless directed at any time by the Division to change or revert to both.

REPORTING REQUIREMENTS

Results of all toxicity tests conducted with any species shall be reported according to the most recent format provided by the Division of Water. Notification of failed test shall be made to the Division's Water Quality Branch within five days of test completion. Test reports shall be submitted to the Division's Water Quality Branch within thirty (30) days of completion.

PART V - BIOMONITORING - ACUTE CONCERNS

ACUTE TOXICITY

If noncompliance with the toxicity limit occurs in an initial test, (i.e., the LC_{50} for either species in either grab sample is less than 14.5% effluent), the permittee must repeat the test using new grab samples collected approximately 12 hours apart. Sampling must be initiated within 10 days of completing the failed test. The second round of testing shall include both species unless approved for only the most sensitive species by the Division. Results of the second round of testing will be used to evaluate the persistence of the toxic event and the possible need for a Toxicity Reduction Evaluation (TRE).

If the second round of testing also demonstrates noncompliance with the toxicity limit, the permittee will be required to perform accelerated testing as specified in the following paragraphs.

Complete four additional rounds of testing to evaluate the frequency and degree of toxicity within 60 days of completing the second failed round of testing. Results of the initial and second rounds of testing specified above plus the four additional rounds of testing will be used in deciding if a TRE shall be required.

If results from any two of six rounds of testing show a significant noncompliance with the acute limit, (i.e., ≥ 1.2 times the TU_a), or results from any four of the six tests show acute toxicity (as defined in 1.A), a TRE will be required.

The permittee shall provide written notification to the Division of Water within five (5) days of completing the accelerated testing, stating that: (1) toxicity persisted and that a TRE will be initiated; or (2) that toxicity did not persist and normal testing will resume.

Should toxicity prove not to be persistent during the accelerated testing period, but reoccur within 12 months of the initial failure at a level ≥ 1.2 times the TU_a , then a TRE shall be required.

TOXICITY REDUCTION EVALUATION (TRE)

Having determined that a TRE is required, the permittee shall initiate and/or continue at least monthly testing with both species until such time as a specific TRE plan is approved by the Division. A TRE plan shall be developed by the permittee and submitted to the Division within thirty days of determining a TRE is required. The plan shall be developed in accordance with the most recent EPA and Division guidance. Questions regarding this process may be submitted to the Division's Water Quality Branch.

The TRE plan shall include Toxic Identification Evaluation (TIE) procedures, treatability studies, and evaluations of: chemical usage including changes in types, handling and suppliers; operational and process procedures; housekeeping and maintenance activities; and raw materials. The TRE plan will establish an implementation schedule to begin immediately upon approval by the Division, to have duration of at least six months, and not to exceed 24 months. The implementation schedule shall include quarterly progress reports being submitted to the Division's Water Quality Branch, due the last day of the month following each calendar quarter.

PART V - BIOMONITORING - ACUTE CONCERNS

TOXICITY REDUCTION EVALUATION (TRE)

Upon completion of the TRE, the permittee shall submit a final report detailing the findings of the TRE and actions taken or to be taken to prevent the reoccurrence of toxicity. This final report shall include: the toxicant(s), if any are identified; treatment options; operational changes; and the proposed resolutions including an implementation schedule not to exceed 180 days.

Should the permittee determine the toxicant(s) and/or a workable treatment prior to the planned conclusion of the TRE, the permittee will notify the Division's Water Quality Branch within five days of making that determination and take appropriate actions to implement the solution within 180 days of that notification.

TEST METHODS

All test organisms, procedures, and quality assurance criteria used shall be in accordance with Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, EPA-821-R-02-012 (5th edition), the most recently published edition of this publication, or as approved in advance by the Division of Water.

Toxicity testing for compliance to KPDES discharge limits shall be performed by a laboratory approved by the Division of Water to conduct the required toxicity tests. Within each toxicity report to the Division, the permittee must demonstrate successful performance of reference toxicant testing by the laboratory that conducts their effluent toxicity tests. Within 30 days prior to initiating an effluent toxicity test, a reference toxicant test must be completed for the method used; alternatively, the reference toxicant test may be run concurrent with the effluent toxicity test. In addition, for each test method, at least 5 acceptable reference toxicant tests must be completed by the laboratory prior to performing the effluent toxicity test. A control chart including the most recent reference toxicant test endpoints for the effluent test method (minimum of 5, up to 20 if available) shall be part of the report.

FACT SHEET ATTACHMENT A - REGULATORY REQUIREMENTS

EFFLUENT GUIDELINES

PART 430—THE PULP, PAPER, AND PAPERBOARD POINT SOURCE CATEGORY

Subpart I—Secondary Fiber Deink Subcategory

Section 430.90 - Applicability; description of the secondary fiber deink subcategory.

The provisions of this subpart are applicable to discharges resulting from the integrated production of pulp and paper at deink mills.

Section 430.95 - New source performance standards (NSPS)

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the maximum day and average of 30 consecutive days effluent limitations for BOD₅ and TSS, but shall be subject to annual average effluent limitations. Also, for non-continuous dischargers, concentration limitations (mg/l) shall apply, where provided. Concentration limitations will only apply to non-continuous dischargers. Only facilities where chlorophenolic-containing biocides are used shall be subject to pentachlorophenol and trichlorophenol limitations. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides:

NSPS for facilities where tissue paper is produced		
Pollutant or Pollutant Characteristic	Maximum for Any 1 Day (lbs per 1,000 lb of product)	Average of Daily Values for 30 Consecutive Days (lbs per 1,000 lb of product)
BOD ₅	9.6	5.2
Total Suspended Solids	13.1	6.8
Pentachlorophenol	0.0030	-
Trichlorophenol	0.0069	-

pH must be within the range of 5.0 to 9.0 at all times.

Subpart L - Tissue, Filter, Non-Woven, and Paperboard From Purchased Pulp Subcategory

Section 430.125 - New source performance standards (NSPS).

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the maximum day and average of 30 consecutive days effluent limitations for BOD₅ and TSS, but shall be subject to annual average effluent limitations. Also, for non-continuous dischargers, concentration limitations (mg/l) shall apply, where provided. Concentration limitations will only apply to non-continuous dischargers. Only facilities where chlorophenolic-containing biocides are used shall be subject to pentachlorophenol and trichlorophenol limitations. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides:

EFFLUENT GUIDELINES - continued

NSPS for non-integrated mills where tissue papers are produced from purchased		
Pollutant or Pollutant Characteristic	Maximum for Any 1 Day (lbs per 1,000 lb of product)	Average of Daily Values for 30 Consecutive Days (lbs per 1,000 lb of product)
BOD ₅	7.0	3.4
Total Suspended Solids	6.0	2.6
Pentachlorophenol	0.0028	-
Trichlorophenol	0.00096	-

pH must be within the range of 5.0 to 9.0 at all times.

OUTFALL 001 - LIMITS CALCULATIONS

Nonintegrated Tissue Production (326,000 lbs/day) and Deinked Tissue Production (560,000 lbs.day) Components:

Monthly Average = $\sum(\text{Production Rate} \times \text{Effluent Guideline Average Factor})$

Daily Maximum = $\sum(\text{Production Rate} \times \text{Effluent Guideline Maximum Factor})$

Where: Production Rate is in lbs/day
 Average Factor is the average of the daily values for 30 consecutive days
 Maximum Factor is the maximum for any one (1) day

NSPS for facilities where tissue paper is produced (430.95)		
Pollutant or Pollutant Characteristic	Maximum for Any 1 Day (lbs/day)	Average of Daily Values for 30 Consecutive Days (lbs/day)
BOD ₅	2282	1108
Total Suspended Solids	1956	878
Pentachlorophenol	0.91	-
Trichlorophenol	0.31	-

NSPS for non-integrated mills where tissue papers are produced from purchased (430.125)		
Pollutant or Pollutant Characteristic	Maximum for Any 1 Day (lbs/day)	Average of Daily Values for 30 Consecutive Days (lbs/day)
BOD ₅	5376	2912
Total Suspended Solids	7336	3808
Pentachlorophenol	1.68	-
Trichlorophenol	3.86	-

OUTFALL 001 - TOTAL LIMITS

Pollutant or Pollutant Characteristic	Maximum for Any 1 Day (lbs/day)	Average of Daily Values for 30 Consecutive Days (lbs/day)
BOD ₅	7658	4020
Total Suspended Solids	9292	4656
Pentachlorophenol	2.59	-
Trichlorophenol	4.17	-

ATTACHMENT B - CORMIX DIFFUSER MODELING

CORMIX SESSION REPORT

CORMIX MIXING ZONE EXPERT SYSTEM
CORMIX Version 5.0GT
HYDRO2: Version March, 2007

SITE NAME/LABEL: Kimberly-Clark KY0095192
DESIGN CASE: Outfall 001 Toxicity
FILE NAME: C:\Program Files\CORMIX 5.0 TEST\MyFiles\Kimberly-Clark
Toxicity.prd
Using subsystem CORMIX2: Multiport Diffuser Discharges
Start of session: 07/21/2009--16:44:05

SUMMARY OF INPUT DATA:

AMBIENT PARAMETERS:

Cross-section = bounded
Width BS = 661 m
Channel regularity ICHREG = 1
Ambient flowrate QA = 277.41 m³/s
Average depth HA = 6.1 m
Depth at discharge HD = 7.93 m
Ambient velocity UA = 0.0688 m/s
Darcy-Weisbach friction factor F = 0.0269
Calculated from Manning's n = 0.025
Wind velocity UW = 2 m/s
Stratification Type STRCND = U
Surface temperature = 25 degC
Bottom temperature = 25 degC
Calculated FRESH-WATER DENSITY values:
Surface density RHOAS = 997.0456 kg/m³
Bottom density RHOAB = 997.0456 kg/m³

DISCHARGE PARAMETERS:

Submerged Multiport Diffuser Discharge
Diffuser type DITYPE = unidirectional perpendicular
Diffuser length LD = 36.60 m
Nearest bank = left
Diffuser endpoints YB1 = 3 m; YB2 = 39.60 m
Number of openings NOPEN = 7
Number of Risers NRISER = 7
Ports/Nozzles per Riser NPPERR = 1
Spacing between risers/openings SPAC = 6.10 m
Port/Nozzle diameter D0 = 0.102 m
with contraction ratio = 1
Equivalent slot width B0 = 0.0016 m
Total area of openings TA0 = 0.0572 m²
Discharge velocity U0 = 2.67 m/s
Total discharge flowrate Q0 = 0.153 m³/s
Discharge port height H0 = 1.18 m
Nozzle arrangement BETYPE = unidirectional without fanning
Diffuser alignment angle GAMMA = 90 deg
Vertical discharge angle THETA = 30 deg
Actual Vertical discharge angle THEAC = 30 deg
Horizontal discharge angle SIGMA = 0 deg

CORMIX SESSION REPORT - continued

Relative orientation angle	BETA	= 90 deg
Discharge temperature (freshwater)		= 35 degC
Corresponding density	RHO0	= 994.0294 kg/m ³
Density difference	DRHO	= 3.0161 kg/m ³
Buoyant acceleration	GP0	= 0.0297 m/s ²
Discharge concentration	C0	= 7.02 TUa
Surface heat exchange coeff.	KS	= 0 m/s
Coefficient of decay	KD	= 0 /s

FLUX VARIABLES PER UNIT DIFFUSER LENGTH:

Discharge (volume flux)	q0	= 0.003864 m ² /s
Momentum flux	m0	= 0.010335 m ³ /s ²
Buoyancy flux	j0	= 0.000115 m ³ /s ³

DISCHARGE/ENVIRONMENT LENGTH SCALES:

LQ = 0.00 m	Lm = 2.18 m	LM = 4.49 m
lm' = 99999 m	Lb' = 99999 m	La = 99999 m

(These refer to the actual discharge/environment length scales.)

NON-DIMENSIONAL PARAMETERS:

Slot Froude number	FR0	= 392.84
Port/nozzle Froude number	FRD0	= 48.63
Velocity ratio	R	= 38.88

MIXING ZONE / TOXIC DILUTION ZONE / AREA OF INTEREST PARAMETERS:

Toxic discharge		= yes
CMC concentration	CMC	= 1 TUa
CCC concentration	CCC	= 0.1 TUa
Water quality standard specified		= given by CCC value
Regulatory mixing zone		= yes
Regulatory mixing zone specification		= distance
Regulatory mixing zone value		= 220 m (m ² if area)
Region of interest		= 6610 m

HYDRODYNAMIC CLASSIFICATION:

| FLOW CLASS = MU2 |

This flow configuration applies to a layer corresponding to the full water depth at the discharge site.

Applicable layer depth = water depth = 7.93 m

MIXING ZONE EVALUATION (hydrodynamic and regulatory summary):

X-Y-Z Coordinate system:

Origin is located at the bottom below the port center:

0 m from the left bank/shore.

Number of display steps NSTEP = 50 per module.

NEAR-FIELD REGION (NFR) CONDITIONS :

Note: The NFR is the zone of strong initial mixing. It has no regulatory implication. However, this information may be useful for the discharge designer because the mixing in the NFR is usually sensitive to the discharge design conditions.

Pollutant concentration at NFR edge c = 0.0449 TUa

CORMIX SESSION REPORT - continued

Dilution at edge of NFR s = 156.4
NFR Location: x = 39.60 m
 (centerline coordinates) y = 0 m
 z = 7.93 m
NFR plume dimensions: half-width (bh) = 35.67 m
 thickness (bv) = 7.93 m
Cumulative travel time: 460.9916 sec.

Buoyancy assessment:

The effluent density is less than the surrounding ambient water density at the discharge level.
Therefore, the effluent is POSITIVELY BUOYANT and will tend to rise towards the surface.

Near-field instability behavior:

The diffuser flow will experience instabilities with full vertical mixing in the near-field.
There may be benthic impact of high pollutant concentrations.

FAR-FIELD MIXING SUMMARY:

Plume is vertically fully mixed WITHIN NEAR-FIELD (or a fraction thereof), but RE-STRATIFIES LATER.
Plume becomes vertically fully mixed again at 4914.85 m downstream.

PLUME BANK CONTACT SUMMARY:

Plume in bounded section contacts nearest bank at 39.60 m downstream.
Plume contacts second bank at 4379.55 m downstream.

***** TOXIC DILUTION ZONE SUMMARY *****

Recall: The TDZ corresponds to the three (3) criteria issued in the USEPA Technical Support Document (TSD) for Water Quality-based Toxics Control, 1991 (EPA/505/2-90-001).

Criterion maximum concentration (CMC) = 1 TUa
Corresponding dilution = 7.02

The CMC was encountered at the following plume position:

Plume location: x = 0.71 m
 (centerline coordinates) y = 0 m
 z = 1.23 m
Plume dimension: half-width (bh) = 39.39 m
 thickness (bv) = 0.14 m

CRITERION 1: This location is within 50 times the discharge length scale of Lq = 0.09 m.

+++++ The discharge length scale TEST for the TDZ has been SATISFIED. +++++

CRITERION 2: This location is within 5 times the ambient water depth of HD = 7.93 m.

+++++ The ambient depth TEST for the TDZ has been SATISFIED.+++++

CRITERION 3: This location is within one tenth the distance of the extent of the Regulatory Mixing Zone of 220 m downstream.

+++++ The Regulatory Mixing Zone TEST for the TDZ has been SATISFIED. +++++

The diffuser discharge velocity is equal to 2.67 m/s.
This is below the value of 3.0 m/s recommended in the TSD.

CORMIX SESSION REPORT - continued

*** All three CMC criteria for the TDZ are SATISFIED for this discharge. ***
***** REGULATORY MIXING ZONE SUMMARY *****

The plume conditions at the boundary of the specified RMZ are as follows:

Pollutant concentration c = 0.037654 TUa
Corresponding dilution s = 186.5
Plume location: x = 220 m
 (centerline coordinates) y = 0 m
 z = 7.93 m

Plume dimensions: half-width (bh) = 109.07 m
 thickness (bv) = 3.80 m

Cumulative travel time: 3081.6392 sec.

At this position, the plume is CONTACTING the LEFT bank.

Furthermore, the CCC for the toxic pollutant has indeed been met within the RMZ. In particular:

The CCC was encountered at the following plume position:

The CCC for the toxic pollutant was encountered at the following plume position:

CCC = 0.1 TUa
Corresponding dilution = 70.2
Plume location: x = 7.86 m
 (centerline coordinates) y = 0 m
 z = 1.73 m

Plume dimensions: half-width (bh) = 37.82 m
 thickness (bv) = 1.57 m

***** FINAL DESIGN ADVICE AND COMMENTS *****

CORMIX2 uses the TWO-DIMENSIONAL SLOT DIFFUSER CONCEPT to represent the actual three-dimensional diffuser geometry. Thus, it approximates the details of the merging process of the individual jets from each port/nozzle.

In the present design, the spacing between adjacent ports/nozzles (or riser assemblies) is of the order of, or less than, the local water depth so that the slot diffuser approximation holds well.

Nevertheless, if this is a final design, the user is advised to use a final CORMIX1 (single port discharge) analysis, with discharge data for an individual diffuser jet/plume, in order to compare to the present near-field prediction.

STRONG BANK INTERACTION will occur for this perpendicular diffuser type due to its proximity to the bank (shoreline). The shoreline acts as a SYMMETRY LINE for the diffuser flow field.

REMINDER: The user must take note that HYDRODYNAMIC MODELING by any known technique is NOT AN EXACT SCIENCE.

Extensive comparison with field and laboratory data has shown that the CORMIX predictions on dilutions and concentrations (with associated plume geometries) are reliable for the majority of cases and are accurate to within about +/-50% (standard deviation).

As a further safeguard, CORMIX will not give predictions whenever it judges the design configuration as highly complex and uncertain for prediction.

ATTACHMENT B - CORMIX DIFFUSER MODELING

CORMIX Prediction File

CORMIX2 PREDICTION FILE:

CASE DESCRIPTION

Site name/label: Kimberly-Clark KY0095192
 Design case: Outfall 001 Toxicity
 FILE NAME: C:\...\RMIX 5.0_TEST\MyFiles\Kimberly-Clark Toxicity.prd
 Time stamp: Tue Jul 21 16:44:05 2009

ENVIRONMENT PARAMETERS (metric units)

Bounded section

BS = 661.00 AS = 4032.10 QA = 277.41 ICHREG= 1
 HA = 6.10 HD = 7.93
 UA = 0.069 F = 0.027 USTAR = 0.3986E-02
 UW = 2.000 UWSTAR=0.2198E-02
 Uniform density environment
 STRCND= U RHOAM = 997.0456

DIFFUSER DISCHARGE PARAMETERS (metric units)

Diffuser type: DITYPE= unidirectional_perpendicular
 BANK = LEFT DISTB = 0.00 YB1 = 3.00 YB2 = 39.60
 LD = 36.60 NOPEN = 7 SPAC = 6.10
 D0 = 0.102 A0 = 0.008 H0 = 1.18 SUB0 = 6.75
 Nozzle/port arrangement: unidirectional_without_fanning
 GAMMA = 90.00 THETA = 30.00 SIGMA = 0.00 BETA = 90.00
 U0 = 2.675 Q0 = 0.153 = 0.1530E+00
 RHO0 = 994.0294 DRHO0 = 0.3016E+01 GP0 = 0.2967E-01
 C0 = 0.7020E+01 CUNITS= TUa
 IPOLL = 1 KS = 0.0000E+00 KD = 0.0000E+00

DIFFUSER PARAMETERS WITH IMAGE EFFECTS (metric units)

The bank/shore proximity effect is accounted for by the following flow variables and definitions of length scales and parameters.

LD = 79.20 Q0 = 0.306 = 0.3060E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)

q0 = 0.3864E-02 m0 = 0.1118E-01 j0 = 0.1240E-03 SIGNJ0= 1.0
 Associated 2-d length scales (meters)
 lQ=B = 0.001 lM = 4.49 l m = 2.18
 lmp = 99999.00 lbp = 99999.00 la = 99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)

Q0 = 0.3060E+00 M0 = 0.8856E+00 J0 = 0.9822E-02
 Associated 3-d length scales (meters)
 LQ = 0.09 LM = 9.21 Lm = 13.15 Lb = 27.87
 Lmp = 99999.00 Lbp = 99999.00

NON-DIMENSIONAL PARAMETERS

FR0 = 392.84 FRD0 = 48.63 R = 38.88 PL = 94.
 (slot) (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR RISER GROUPS:

Properties of riser group with 1 ports/nozzles each:
 U0 = 2.675 D0 = 0.102 A0 = 0.008 THETA = 30.00
 FR0 = 392.84 FRD0 = 48.63 R = 38.88
 (slot) (riser group)

CORMIX PREDICTION FILE: - continued

X	Y	Z	S	C	BV	BH
0.00	0.00	1.18	1.0	0.702E+01	0.00	39.60

** CMC HAS BEEN FOUND **

The pollutant concentration in the plume falls below CMC value of 0.100E+01 in the current prediction interval.

This is the extent of the TOXIC DILUTION ZONE.

0.79	0.00	1.24	23.0	0.306E+00	0.16	39.37
1.58	0.00	1.29	32.1	0.219E+00	0.32	39.15
2.38	0.00	1.35	39.1	0.180E+00	0.48	38.95
3.17	0.00	1.40	45.0	0.156E+00	0.63	38.76
3.96	0.00	1.46	50.1	0.140E+00	0.79	38.58
4.75	0.00	1.51	54.8	0.128E+00	0.95	38.41
5.54	0.00	1.57	59.1	0.119E+00	1.11	38.25
6.34	0.00	1.63	63.2	0.111E+00	1.27	38.09
7.13	0.00	1.68	66.9	0.105E+00	1.43	37.95

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **

The pollutant concentration in the plume falls below water quality standard or CCC value of 0.100E+00 in the current prediction interval.

This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

7.92	0.00	1.74	70.5	0.996E-01	1.59	37.81
8.71	0.00	1.79	73.9	0.950E-01	1.74	37.68
9.50	0.00	1.85	77.1	0.910E-01	1.90	37.56

38.02	0.00	3.85	153.3	0.458E-01	7.61	35.68
38.81	0.00	3.91	154.8	0.453E-01	7.77	35.67
39.60	0.00	3.96	156.4	0.449E-01	7.93	35.67

Cumulative travel time = 460.9916 sec

Plume centerline may exhibit slight discontinuities in transition to subsequent far-field module.

END OF MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

BEGIN MOD251: DIFFUSER PLUME IN CO-FLOW

Phase 1: Vertically mixed, Phase 2: Re-stratified

Phase 2: The flow has RESTRATIFIED at the beginning of this zone.

This flow region is INSIGNIFICANT in spatial extent and will be by-passed.

END OF MOD251: DIFFUSER PLUME IN CO-FLOW

** End of NEAR-FIELD REGION (NFR) **

The initial plume WIDTH values in the next far-field module will be CORRECTED by a factor 1.23 to conserve the mass flux in the far-field!

Recall that the plume is symmetric to the bank/shore on which the centerline (X-axis) is located.

CORMIX PREDICTION FILE: - continued

BEGIN MOD241: BUOYANT AMBIENT SPREADING

Plume is ATTACHED to LEFT bank/shore.

Plume width is now determined from LEFT bank/shore.

Profile definitions:

- BV = top-hat thickness, measured vertically
- BH = top-hat half-width, measured horizontally in y-direction
- ZU = upper plume boundary (Z-coordinate)
- ZL = lower plume boundary (Z-coordinate)
- S = hydrodynamic average (bulk) dilution
- C = average (bulk) concentration (includes reaction effects, if any)

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
39.60	0.00	7.93	156.4	0.449E-01	6.10	56.99	7.93	1.83
126.40	0.00	7.93	173.3	0.405E-01	4.58	84.16	7.93	3.35
213.20	0.00	7.93	185.6	0.378E-01	3.84	107.39	7.93	4.09

** REGULATORY MIXING ZONE BOUNDARY **

In this prediction interval the plume DOWNSTREAM distance meets or exceeds the regulatory value = 220.00 m.

This is the extent of the REGULATORY MIXING ZONE.

300.00	0.00	7.93	196.2	0.358E-01	3.40	128.26	7.93	4.53
386.80	0.00	7.93	206.1	0.341E-01	3.11	147.49	7.93	4.82
473.59	0.00	7.93	215.8	0.325E-01	2.90	165.49	7.93	5.03

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4205.95	0.00	7.93	1678.9	0.418E-02	5.80	643.71	7.93	2.13
4292.75	0.00	7.93	1746.3	0.402E-02	5.95	652.39	7.93	1.98
4379.54	0.00	7.93	1815.5	0.387E-02	6.10	661.00	7.93	1.83

Cumulative travel time = 63506.8320 sec

Plume is LATERALLY FULLY MIXED at the end of the buoyant spreading regime.

END OF MOD241: BUOYANT AMBIENT SPREADING

Due to the attachment or proximity of the plume to the bottom, the bottom coordinate for the FAR-FIELD differs from the ambient depth, ZFB = 0 m.
In a subsequent analysis set "depth at discharge" equal to "ambient depth".

BEGIN MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

Vertical diffusivity (initial value) = 0.666E-02 m²/s
Horizontal diffusivity (initial value) = 0.833E-02 m²/s

Profile definitions:

- BV = Gaussian s.d.*sqrt(pi/2) (46%) thickness, measured vertically
= or equal to layer depth, if fully mixed
- BH = Gaussian s.d.*sqrt(pi/2) (46%) half-width,
measured horizontally in Y-direction
- ZU = upper plume boundary (Z-coordinate)
- ZL = lower plume boundary (Z-coordinate)
- S = hydrodynamic centerline dilution
- C = centerline concentration (includes reaction effects, if any)

